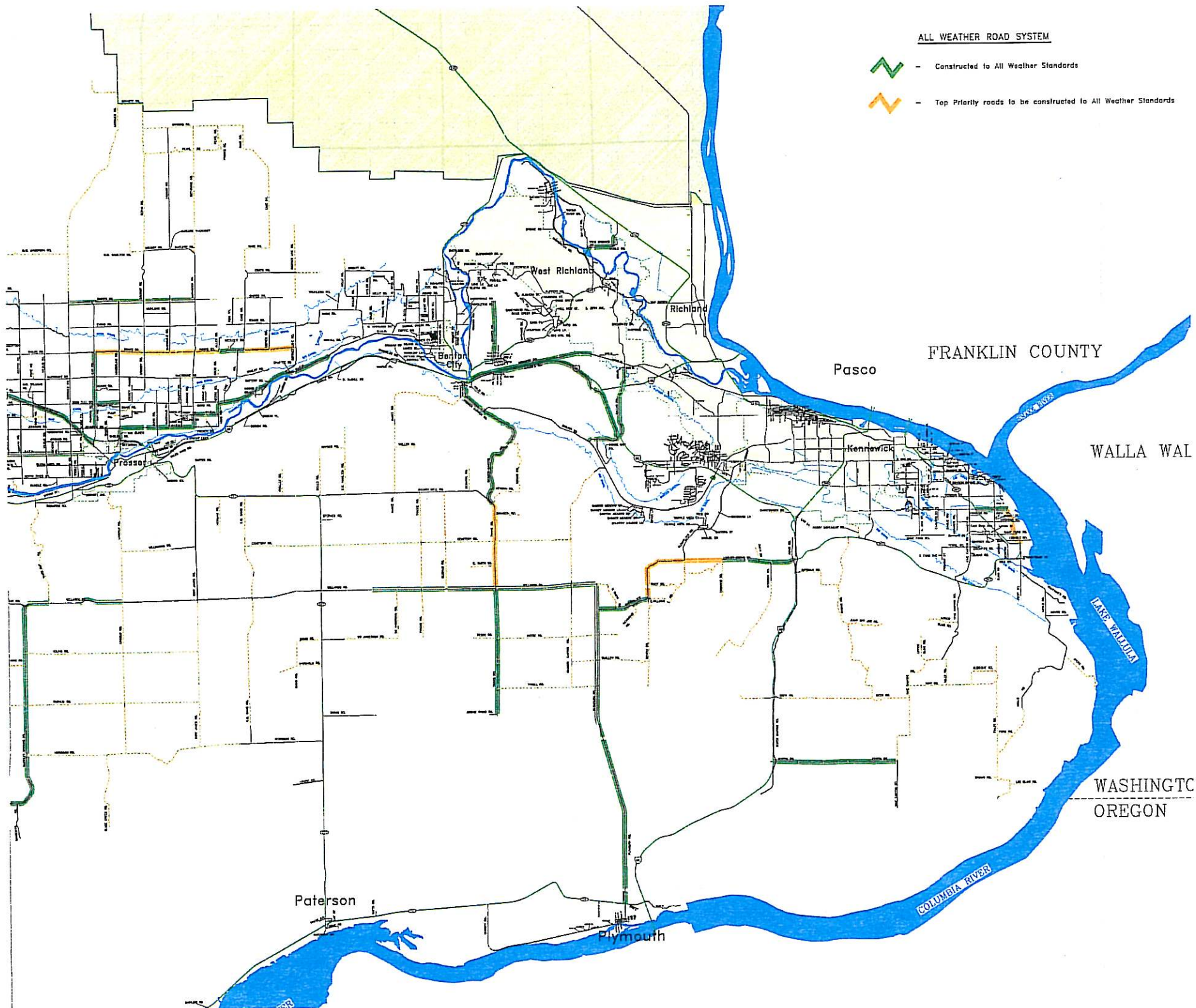


Benton County Transportation

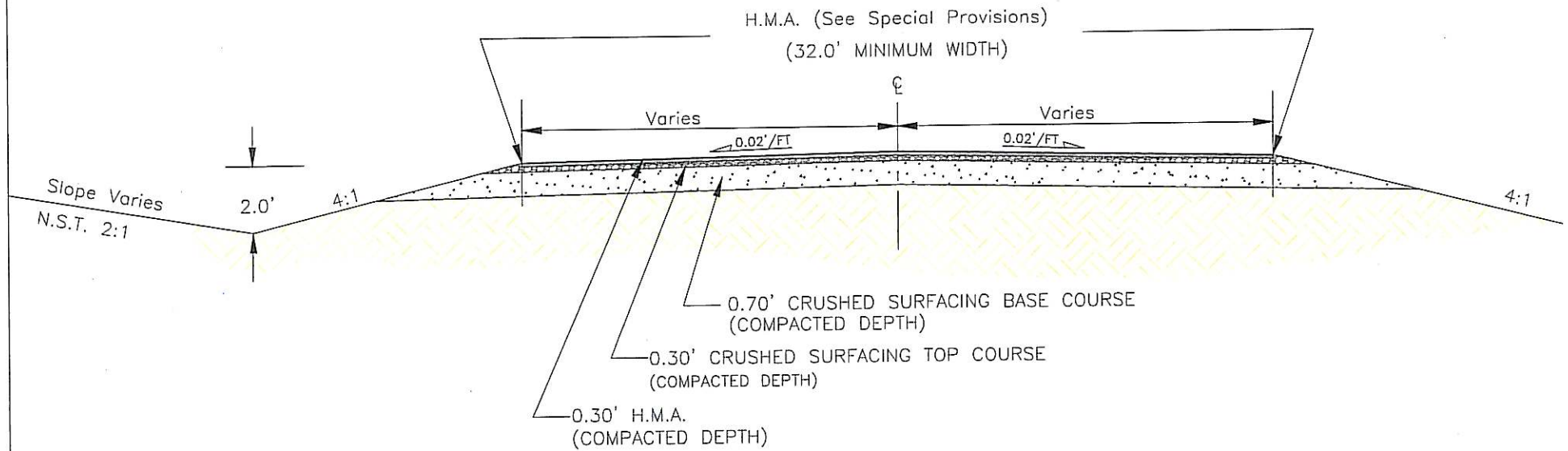




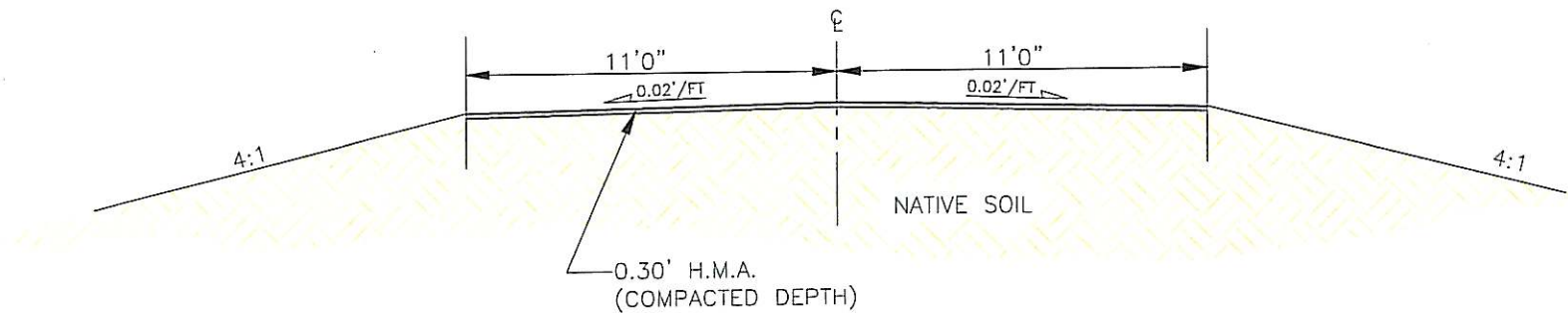
All Weather Roads

- Year round freight
- Goal: product to market unhindered year round.
- Action: complete and expand the all weather network.

PROPOSED ALL WEATHER ROAD SECTION



EXISTING ROAD



Benton Co Safety Actions

crashes and one left-turn crash. One of the run-off road crashes was a fatal crash and another resulted in injury. Three of the crashes at this intersection occurred during periods of darkness.

Crash Rates

The number of crashes at any location is usually a function of how many vehicles drive through that location. As the number of vehicles increases, the number of crashes typically increases as well. The use of crash rates accounts for this variability and allows for an equitable comparison of locations with similar characteristics but different volumes. The use of crash rates also allows for comparison to county, regional, and statewide data for similar facility types.

Fatal Crash Rates

An average fatal crash rate over the last ten years was calculated for sections of roadway that encompassed the intersections with fatalities in the Roza Area. Table 1 shows the fatal crash rate per 100 million vehicle miles of travel (VMT). A weighted Average Daily Traffic (ADT) was used to account for the differences in traffic volumes along the section of roadway analyzed. Since WSDOT only calculates average crash rates over a one-year period, we looked at all available crash rates over the past ten years to ascertain a good comparison number. Table 2 shows all available WSDOT total and fatal crash rates for the past ten years. Note that total crash rates are listed in crashes per one million vehicle miles of travel (MVT) and fatal crash rates are listed in crashes per one hundred million VMT. Until 2007, WSDOT crash rates were only calculated for state roads and did not include county and local roads. For this reason, the WSDOT regional fatal crash rate for 2007 was chosen for a comparison number. Since all of the Roza Area fatal crash rates are significantly higher than any of the fatal crash rates WSDOT has available for the past ten years, whether we used an average or picked the highest rate it would not change the magnitude of difference between most of the Roza Area fatal crash rates and the WSDOT regional fatal crash rate.

The Critical Crash Rate is a statistically derived number, greater than the average rate, which serves as a screening measure to identify locations where crash occurrence is higher than should be expected for a given facility type and for which safety measures should be considered. As shown in Table 1, all of the Roza Area fatal crash rates were higher than the critical crash rates which means they are significantly higher than they should be for a rural collector road in this region (99.5% level of confidence).

Table 1. Fatal Crash Rates on Roza Area Roadways

<i>Section</i>	<i>Fatal Crash Rate*</i>	<i>Regional Rate - Rural Collector*</i>	<i>Critical Crash Rate*</i>	<i>Number of Fatal crashes</i>	<i>Weighted ADT (vehicles per day)</i>	<i>Length (miles)</i>
Gap from OIE to Hanks	37.26	3.36	5.09	3	720	3.06
Hinzerling from OIE to King Tull	33.02	3.36	5.37	2	1600	1.04
OIE from Gap to Hinzerling	30.21	3.36	5.27	2	1780	1.02
Hanks from Griffin to Gap	24.82	3.36	4.76	3	1100	3.01
King Tull from Gap to Bunn	18.33	3.36	4.84	2	1190	2.51
OIE from Gap to Hess (E)	5.81	3.36	4.03	3	2180	6.49

**all rates in this table are in crashes/100million VMT*

Intersections						
Crash Type	Contributing Circumstances	Countermeasure	Possible Reduction in Crashes*			
			All	Angle	Left-Turn	Fatal/Injury
		Flashing Beacon on intersection warning sign (e.g. flasher on stop ahead sign)	25-28%			
		Transverse Rumble Strips on approach	23-35%			
		Install Stop bars with short segment of centerline	19%	47%		
		Increase size of intersection warning signs (from 30" to 36")	15%			
		Install double stop signs with splitter island on minor approach	11%	36-55%		35-40%
	Sight Distance	Improve sight distance	5-17%			
Sections						
Crash Type	Contributing Circumstances	Countermeasure	Possible Reduction in Crashes*			
			All	Run-Off Road	Fatal/Injury	Injury
Run-Off Road	Horizontal Curve	Install curve advance warning signs w/flashing beacon	30%			
		Install curve advance warning signs w/advisory speed	20-30%	30%		13%
		Install curve advance warning signs	20-30%	30%	10-55%	25%
		Install chevrons throughout curve				30%

*Information compiled from FHWA's Desktop Reference for Crash Reduction Factors and various research projects

For this Study the following tools or countermeasures were considered to reduce both the number and severity of the crashes at intersections in the Roza Area. Some were discussed with the CAC and quickly eliminated from further evaluation. Others have been recommended for consideration by the County.

Oversized Stop Signs



The visibility of intersections and thus the ability of approaching drivers to perceive them can be enhanced by installing larger stop signs at intersections. Intersections with patterns of rear-end, angle, or turning crashes related to lack of driver awareness of the presence of the intersection should be evaluated for oversized stop signs. Care should be taken not to overuse traffic signing, as drivers may become accustomed to their presence and fail to respond as desired at other locations without oversized stop signs. Agencies should strive to use special signing only where a specific problem or circumstance indicates the need.

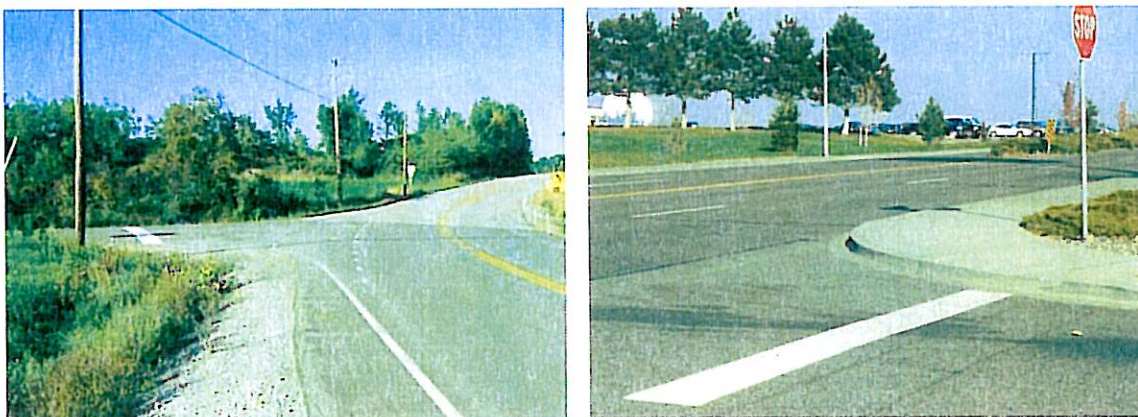
Intersection Warning and Stop Ahead Signs



Unsignalized intersections may not be readily visible to approaching drivers and crashes may occur because approaching drivers may be unaware of the presence of the intersection. The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by advanced warning signing. However, care should be taken not to overuse traffic signing, which could result in drivers not perceiving the presence of intersections.

Making drivers aware that they are approaching an intersection, through the use of enhanced signing and delineation, should improve safety at the intersection because drivers will be more alert to potential vehicles on the cross streets. This heightened awareness will quicken drivers' reaction times when conflicts occur. Signing in conformance with the MUTCD should be provided.

Stop Bars



Providing visible stop bars on minor road approaches to unsignalized intersections can help direct the attention of drivers to the presence of the intersection. Where a stop bar is already in place, provision of a wider stop bar may be considered. Stop bars should be considered at approaches to unsignalized intersections having traffic control devices that are not currently being recognized by some approaching motorists. Locations should be identified by patterns of crashes related to

lack of driver recognition of the traffic control device (e.g., angle crashes related to stop sign violations). In general, this strategy is especially effective when applied on approaches where conditions allow the stop bar to be seen by an approaching driver at a significant distance from the intersection. This strategy is appropriate for locations with a pattern of angle crashes associated with stop sign violations where approaching drivers may not realize that an intersection is present until it is too late to stop.

No-Pass Pavement Markings

The visibility and awareness of intersections may be enhanced by installing no pass striping in advance of intersections. No-pass striping alerts the drivers that there is a situation ahead that does not allow for a safe passing maneuver. This can send an effective message to drivers that are considering a pass maneuver or even following another vehicle.

Stop Ahead Pavement Marking

Providing pavement markings with supplementary messages (such as "STOP AHEAD") can help alert drivers and thus enhance the ability of approaching drivers to be more aware of the presence of the intersection. These markings should be considered at unsignalized intersections with patterns of rear-end, angle, or turning crashes related to lack of driver awareness of the presence of the intersection.



Potential difficulties may be encountered in the winter, when these markings may not be as visible to the driver. The pavement markings may also have a lower coefficient of friction compared to the rest of the approach, especially during wet conditions.

Supplementary pavement markings should follow the MUTCD, which drivers should understand with no need for special public education campaigns.

Rumble Strips



Grooved



Raised

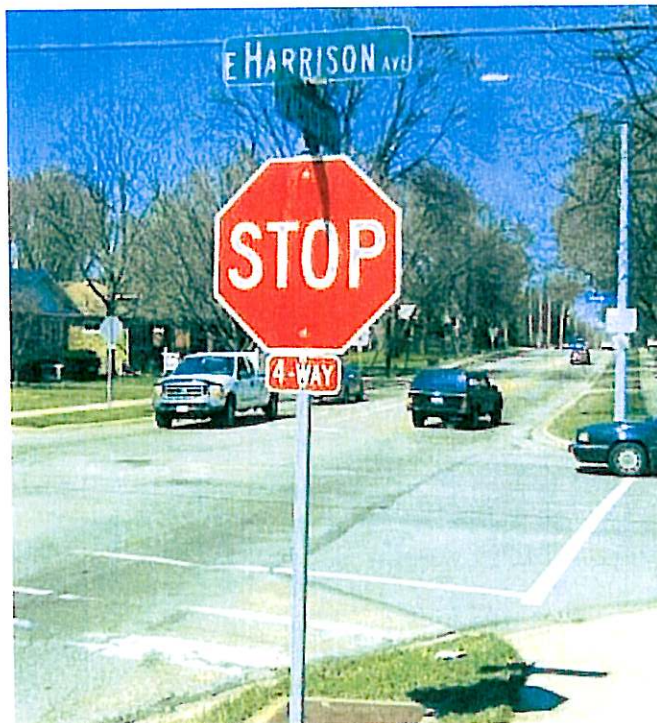
Rumble strips can be installed on intersection approaches to call attention to the presence of the intersection and to the traffic control in use at the intersection. Rumble strips should be used sparingly. Their effectiveness is dependent on being unusual. Rumble strips are normally applied when less intrusive measures—such as pavement markings like "STOP AHEAD" signs, markings, or flashers—have been tried and have failed to correct the crash pattern. Rumble strips can be used to supplement such traffic control devices. For example, a rumble strip can be located so that when the driver crosses the rumble strip, a key traffic control device such as a "STOP AHEAD" sign is directly in view. Use rumble strips sparingly so that they retain their surprise value in gaining the driver's attention. Rumble strips should be considered on approaches to unsignalized intersections with traffic control devices that are not currently being recognized by some approaching motorists. Locations should be identified by patterns of crashes related to lack of driver recognition of the traffic control device (e.g., angle crashes related to stop sign violations).

Rumble strips in the traveled way do have several potential pitfalls that should be considered carefully in any decision to implement them. They include: 1) noise that may disturb nearby residents; 2) potential loss-of-control problems for motorcyclists and bicyclists; 3) difficulties created for snowplow operations; and 4) inappropriate driver responses, such as using the opposing travel lanes to drive around the rumble strips.

All-Way Stops

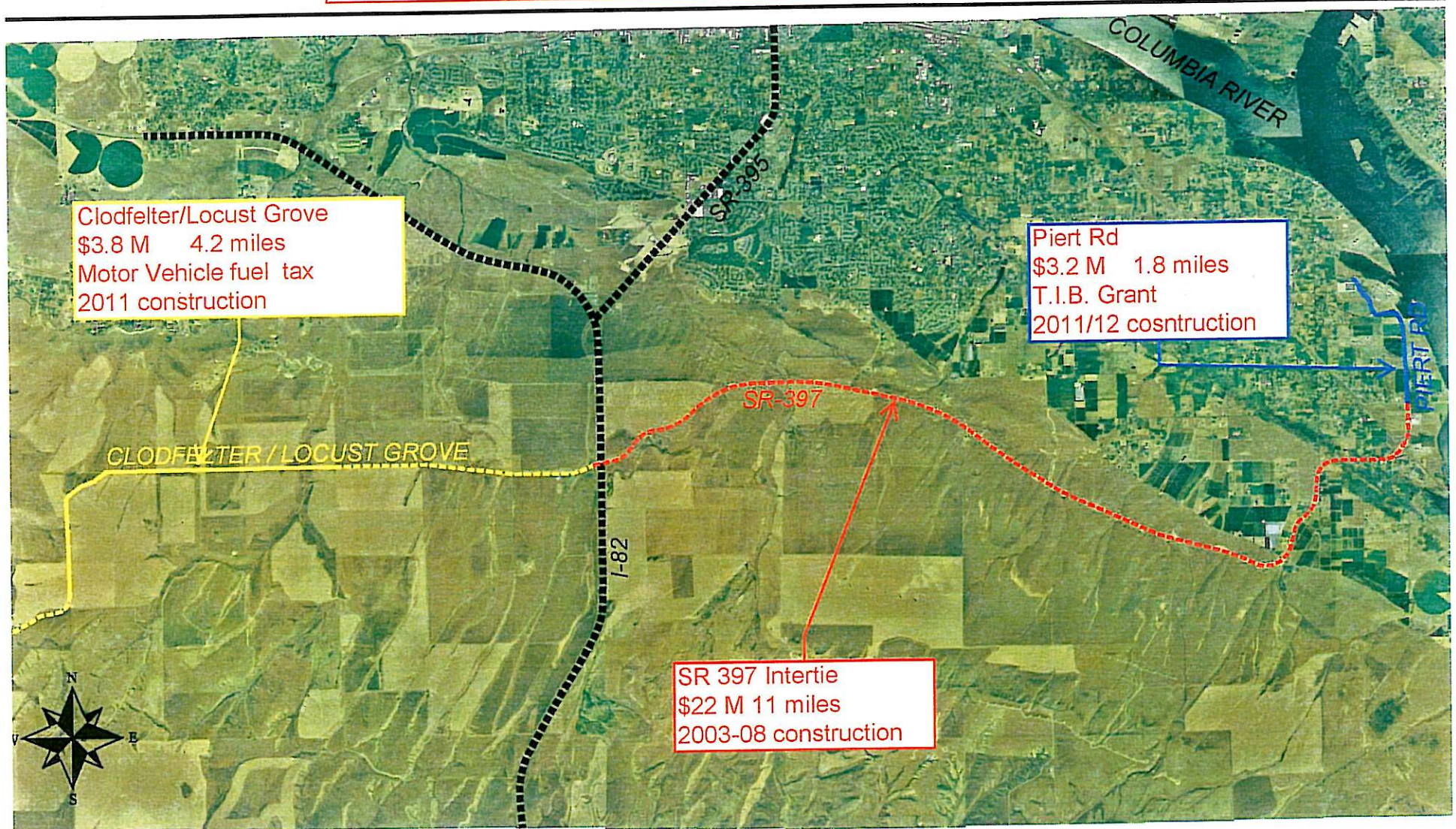
All-way stop control can reduce angle and turning crashes at unsignalized intersections by providing more orderly movement at an intersection, reducing through and turning speeds, and minimizing the safety effect of any sight distance restrictions that may be present. However, all-way stop control is suitable only at intersections with moderate and relatively balanced volume levels on the intersection approaches. Under other conditions, the use of all-way stop control may create unnecessary delays and aggressive driver behavior (e.g., deliberate ignoring of the stop control).

Consider at unsignalized intersections with patterns of angle and turning crashes and moderate and relatively balanced volumes on the intersection approaches.

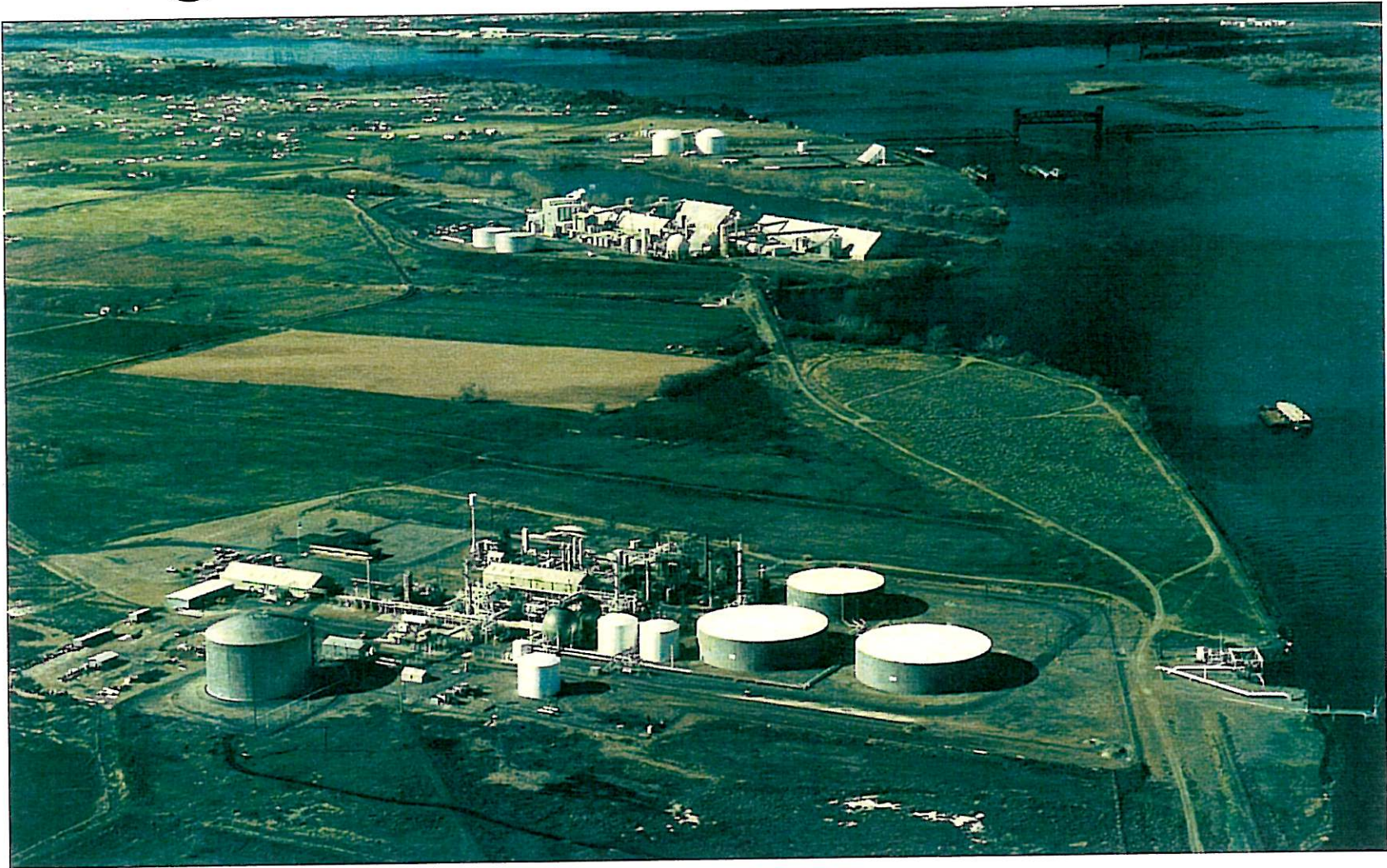


Not every two-way stop-controlled intersection should be considered as a candidate for all-stop control. This strategy should be used selectively, recognizing traffic volumes and patterns and potentially adverse reaction by the driving population to being stopped for no apparent reason. If drivers encounter substantial delays, they may become impatient and act irrationally, which can lead to crash patterns of the type that the strategy is intended to correct.

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